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Heliotropic tone.—PRINGSHEIM discusses in a long and rather technical paper the influence of illumination upon heliotropic tone.⁹ By heliotropic tone he means that internal condition of responsiveness which determines the position of the cardinal points of reaction—the liminal and optimal illumination both for positive and negative response, and the indifferent zone. He shows that the reaction time of heliotropic plants diminishes with increasing intensity of light, rapidly at first, then more slowly and finally becomes constant. Beyond this a false optimum (really temporary indifference) is reached, but only in plants grown in the dark. If such plants, however, after being taken from the dark are rotated for a time in a light to which they will later react, the indifference disappears and the reaction, contrary to the earlier statements, is actually accelerated. This reaction, by a plant attuned to a certain light, is indeed the speediest possible at that intensity. In fact during the first part of the illumination of a plant of low heliotropic tone, the direction of the light is of no significance; for whether rotated or even illuminated from the opposite direction, it reacts just as quickly as though continuously illuminated from one side. The same is true in plants of high tone with stimuli of low intensity. During this first period the plant is merely adjusting its tone to the illumination. This alteration of tone is to be considered as an effect upon the excitable structure itself, produced either by a like or an unlike stimulus. One must distinguish between accommodation or adjustment to a given illumination and *Umschaltung* which determines whether the reaction is to be positive, negative, or none. This *Umschaltung* is dependent on the difference between the existing tone and that corresponding to the intensity of the illumination. If a low-toned plant be brightly lighted it reacts negatively; if weakly, the response is positive. If a high-toned plant is brightly illuminated, it reacts positively; with weak light, it does not respond at all until the tone has fallen far enough, when a positive reaction occurs. The tone in both cases follows the intensity of the illumination, but rises more quickly than it falls. All hypotheses which predicate heliotropic tone as a constant are faulty. The phenomena line up with those already known in certain other organisms and in the human retina, whence it seems probable that they are part of a general physiological law as to light perception.—C. R. B.

Geotropism and heliotropism.—The mutual effect of geotropic and heliotropic stimulation has been the subject of several papers, notably those by WIESNER, NOLL, and CZAPEK. VON GUTTENBERG, working in PFEFFER's laboratory, has lately attacked the problem whether or not when they operate simultaneously on parallelotropic organs an alteration of geotropic tone occurs.¹⁰ He concludes, contrary to other interpretations, that it does not, finding it possible by choosing

⁹ PRINGSHEIM, ERNST, JR., Einfluss der Beleuchtung auf die heliotropische Stimmung. Beitr. Biol. Pfl. 9:263-306. 1907.

¹⁰ VON GUTTENBERG, H. RITTER VON, Ueber das Zusammenwirken von Geotropismus und Heliotropismus in parallelotropen Pflanzenteilen. Jahrb. Wiss. Bot. 45:193-231. 1907.